WATER RESOURCES TASK GROUP ANNUAL REPORT
TO PINEDALE ANTICLINE WORKING GROUP
MEETING OF NOVEMBER 5, 2009

Scope and Introduction

The extraction of natural gas from the Pinedale Anticline requires production wells to be drilled through several aquifers that overlie the producing geologic structures at depth. Water resources are a valuable commodity in the Green River Basin and extremely important for ranching and domestic water supplies in the Pinedale Area. Prevention of ground water contamination through proper well drilling, completion and cementing procedures is the first and best line of defense in protecting aquifers, and standards must be met in accordance with the Mineral Leasing Act. (SCCD Groundwater Monitoring Plan Pinedale Anticline Project Area, 5/2/2003)

The need to protect and monitor water resources is noted in multiple BLM documents, including legislative authority and other directives, e.g.:

1. July 2000 Record of Decision, PAGE 19, Section 3, Conditions of Approval, "…The operators will conduct a survey and a complete water analysis (static water level, alkalinity, salinity, benzene, oil, etc.)...of ALL WATER WELLS within a 1 (one) mile radius of existing and proposed development...and annually monitor and maintain a complete record of water analysis of all new water supply wells drilled in the project area to evaluate the quality of source options in the event some mitigation is required."

2. Appendix C - DRAFT Adaptive Environmental Management Planning Process for the Pinedale Anticline Project Area
   2.1. Resource Monitoring Plans and Objectives:
      2.1.1. Monitoring Plans will be prepared for the following resources and activities. The determination of who will do the on-the-ground monitoring will be made by the Task Group assigned to prepare the monitoring plan.

3. Federal Land Policy and Management Act of 1976 (FLPMA), Public Law 95-87. Land use authorizations must ensure that "…the public lands are managed in such a manner that will protect the quality of …water resource…values. (sec.102(a)(8)). Further, the issuance of any instrument providing for the use, occupancy or development of the public lands must ensure compliance with State or Federal air or water quality standards. Violations of any of the provisions subject the use authorization to revocation or suspension as provided in the act."

The SCCD conducted a field inventory of all groundwater supply wells within one mile of existing and proposed oil and gas development in 2001. The inventory included: casing measurements, static water level when possible, GPS location, description, water well accessibility, pump activity and additional field observations. Beginning August 2004, water samples were collected and tested for alkalinity, salinity, benzene and oil as required by the ROD. Wells within one mile of a producing or new gas well, which can be safely sampled with the permission of the well owner and surface owner/manager, are sampled with the samples forwarded to a certified lab.

The SCCD began a (surface water) Water Quality Sampling Program in 1999 using sampling sites within the New Fork Watershed. Initial sites included an area starting below the New Fork Dam and ending

above the confluence of the New Fork and the Green River. This program continued in 2001, 2002, 2003, with each site being sampled four times during the sampling season. Surface water monitoring was already underway when the PAPA ROD was signed and adapted to fit the needs of the ROD. As a result of WRTG discussions, additional sites were added to detect possible anthropogenic influences and one site was deleted from testing.

The ground water and surface water sampling results are provided to the WRTG annually for discussion and presentation to the PAWG and public. The WRTG makes recommendations on the monitoring program to the PAWG for its review and presentation to the BLM PFO.

Summary of Past Year's Meetings

The Water Resources Task Group (WRTG) held its first meeting on October 21, 2004. Original members were: Gene George, David Russell, Mark Thiesse, Kate Forsting, Tony Gosar, Darrell Walker, Jocelyn Moore and Dr. Mike Kramer. The meeting was facilitated by Dave Roberts of the WY State BLM Office. The TG's task was to create and oversee the implementation of a water resource monitoring plan with a draft plan to be presented to the PAWG by Feb. 2005. The TG agreed to use a "Consensus Agreement" process, i.e. reach a conclusion that members can agree on with the understanding that if consensus is not reached, a minority position can be presented to the PAWG.

The WRTG has held thirteen meetings since the initial meeting five years ago. Membership has remained somewhat stable with five of the original members remaining, i.e., David Russell, Tony Gosar, Darrell Walker, Mike Kramer and Jocelyn Moore. The WRTG has reviewed the groundwater and surface water monitoring reports annually, discussed revisions to chemical parameters and monitoring procedures and made recommendations to the PAWG. BLM support staff have included Dennis Doncaster (2004-present), Catharine Woodfield (2004-2007) and Merry Gamper (2007 - present).

Summary of Past Year's Recommendations

<u>Meeting of September 2008</u>

1. PAWG to request to BLM to test wells not tested due to high LEL alarm soundings – SCCD notifies operator at this point but no procedure to require retesting
2. PAWG to request that BLM send blanket letter to all operators that any wells not tested due to high gas levels will be considered out of compliance and must be tested to bring into compliance
3. Seven (7) water wells closed by operators per SEO request, have resulted in loss of data points; PAWG to suggest to BLM that new monitoring wells be installed near these closed water wells to continue ongoing monitoring program
4. Ongoing erosion/runoff on Mesa has caused multi-year detection of sedimentation loving aquatic worms (whirling disease vectors per Dr. Brant Marshall) on New Fork River; PAWG to suggest to BLM that better enforcement of erosion/stormwater management practices take place
5. TG has agreed to select another baseline/background sampling point (New Fork 1 – too close to Forest Boundary) upstream of Mesa but closer to extraction operations; TG will present new location to PAWG to suggest to BLM to include in new monitoring process
6. PAWG to suggest to BLM that installation of backflow devices, also required by SEO, be implemented in new prevention process
7. PAWG to suggest to BLM that well drillers change procedure to require non oil based pipe dope and "cleaner" drilling procedures

8. PAWG to suggest to BLM that better data handling procedures be required, i.e. multiple year summaries of well data; currently, an independent trend analysis is completed for the surface water data but there is no multi-year compilation of data on ground water data – difficult to grasp overall impact of well contamination;
    a. Analysis to include well depth, static level, perforations from well logs
    b. Include follow up info on well "detects", i.e. VRP results
    c. Increase/decrease in well contamination

Meeting of March 2009

1. PAWG to recommend to BLM for the SCCD to continue groundwater monitoring as conducted in previous sampling years following the Sampling Analysis Plan, with minor revisions noted in the 3/17/09 WRTG meeting.
2. PAWG to recommend to BLM that the SCCD revise its Groundwater Monitoring Manual and Protocol to incorporate the minor revisions as discussed in the 3/17/09 WRTG meeting.
3. PAWG to recommend to BLM that the SCCD add a new surface water sampling site, NF 80, on the New Fork River, upstream of all PAPA oil and gas development activities.

Summary of Ongoing and New Monitoring

Groundwater and surface monitoring has been ongoing with all results presented to the WRTG for discussion at open public meetings and transmittal to the PAWG. Water supply wells with hydrocarbon detections have been noted and when appropriate, referred to the WY Department of Environmental Quality Voluntary Remediation Program (WY DEQ VRP). Some water supply wells have been plugged, due to faulty water well installation or no longer being needed as a water supply, and some data points have been lost. Surface water monitoring has not detected the presence of hydrocarbons but has noted riparian areas with increases in sediment loading and a concurrent increase in the presence of silt loving worms, some of which are vectors for trout whirling disease.

AMEC-GEOMATRIX is conducting a Groundwater Aquifer Monitoring Pollution Prevention study to determine the flow of groundwater, placement of dedicated monitoring wells, and aquifer characterization. Per the September 2008 ROD Final Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project, it is anticipated that the SCCD groundwater monitoring program will continue and may be augmented by results obtained from the GEOMATRIX studies. It is not known at this time if and how these results may determine a change in the current monitoring process.

Discussion of Monitoring Results and Effectiveness

The groundwater monitoring program has been effective in detecting hydrocarbons in water supply wells and providing information on the types and quantities of contaminants. Several water supply wells have been referred to the WYDEQ VRP for further action. Some water wells have been plugged by operators and future testing results are unlikely. A big plus for the monitoring program is the increase in public knowledge of the water resources in Sublette, creation of baseline and ongoing data and a systematic monitoring schedule using standard sampling methods. By mandate, the extraction of one resource should not negatively impact the quality of another resource. The monitoring programs, both surface and ground water, provide scientifically defensible, ongoing data to review and protect water quality and quantity.

New Recommendations
(WRTG October 15, 2009 Meeting)

1. Ask PAWG to recommend that BLM place a copy of the IAMM (GEOMATRIX Groundwater Aquifer Characterization) in the Sublette County Library for public view.
2. Ask PAWG to recommend that BLM notify Water Resource Task Group members when any reports/deliverables regarding WRTG projects are placed on BLM website.
3. Ask PAWG to recommend BLM address erosion and sedimentation practices/soil stabilization controls on BLM access road. [Due to increased sediment loading in New Fork River between sampling sites NF 19 and NF 30 as noted in 2009 report]
4. Ask PAWG to recommend to BLM to allow change in groundwater sampling/monitoring process to add sampling for naphthlene and 2-methyl-naphthalene when BTEX is sampled. [Note, BTEX is a secondary sampling, done when the first sampling detects TPH-GRO (Total Petroleum Hydrocarbons-Gasoline Range Organics) or TPH-DRO (Total Petroleum Hydrocarbons-Diesel Range Organics)]
5. Ask PAWG to recommend to BLM that detection of Chlorides and Fluorides be added to the groundwater sampling results.

Plan for Coming Year

The WRTG plans to meet in March 2010 to discuss possible revisions to the existing Sampling and Analysis Plan to consider increased testing of domestic water wells. This is in response to a request received by the BLM PFO which was brought to the attention of the WRTG at the October 15, 2009 meeting. WRTG members also wish to discuss a method to provide water to a resident whose domestic water supply well is contaminated and needs a replacement source of drinking water. WRTG received a request from public to modify Sampling and Analysis Plan to test for presence of fraccing fluids in water supply wells. The WRTG would like to review and consider the proposed plan for monitoring to be prepared by GEOMATRIX per the September 2008 ROD.